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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/577,166	05/24/2000	Richard L. Sutherland	SAIC0006-US	5232

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EXAMINER
ANGEBRANNDT, MARTIN J

ART UNIT	PAPER NUMBER
1756	9

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/577,166	Applicant(s) SUTHERLAND ET AL.	
	Examiner Martin J Angebranndt	Art Unit 1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 October 2001 and 05 November 2001* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-48* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) *47* is/are allowed.

6)☒ Claim(s) *1-43,46 and 48* is/are rejected.

7)☒ Claim(s) *44 and 45* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *8* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

1. The response provided by the applicant has been read and given careful consideration. The term "variable diffraction efficiency" is held to describe a hologram which can assume varied diffraction efficiencies after recording (ie a PDLC hologram or the like) and not a hologram which exhibits a varied diffraction efficiency. This is enbaled by the disclosure which describes the use of PDLC materials as useful as the master, replica or both in a holographic copying process (1/8-12). Responses to the arguments offered by the applicant are presented after the first rejection to which they are directed.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 32-35 and 37-40 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sturdevant '946, in view of Redfield '861, Hall et al. '326 and Amako et al. '214.

Sturdevant '946 teaches a continuous process where the holographic recording medium is preexposed without any pattern using UV light (21), Then the hologram is exposed using a laser and contact exposure through a holographic master (85) and then post exposed using a UV lamp. (91).

Redfield '861 teaches that the precure to deplete the oxygen and reduce the induction period is disclosed. (10/5-11) Similarly the fixation exposure can be carried out using the reference beam (12/1-20). The use of spatial light modulators is disclosed with respect to figure 1.

Hall et al. '326 teaches the use of either optically or computer generated holograms for contact copying. (10/48-50).

Amako et al. '214 teaches the generation of computer generated holograms using liquid crystal devices. (15/50-53 and 16/29-37) The replay of several holograms having different focal lengths in sequence to form the desired article is disclosed. (16/33-37).

It would have been obvious to one skilled in the art to modify the process of Sturdevant '946 by replacing the three exposure units with one exposure unit capable of performing both the interferometric exposure and the uniform exposures by replacing the holographic master used in the contact exposure with an LC device capable of recording computer generated holograms to save in equiptment costs based upon the disclosure of equivalence for the use of lasers to provide the precure and fixation exposures by Redfield '861 for the same effect and the teachings of Hall et al. '326 that the use of optically produced or computer generated hologram in contact copying processes is equivalent. Further the teachings of Amako et al. '214 establish that in addition to the equivalence in functionality as a hologram the use of a computer to generate the holograms allows the holographic image of the master to be rapidly changed so that a plurality of different holographic images and copies thereof may be formed without the effort of creating an optical master.

The applicant argues that none of the references teach the use of a master hologram for copying where the master can be varied in its diffraction efficiency. The examiner disagrees, noting that Hall et al. '326 and Amako et al. '214 both teach computer generated holograms in LC media. The Hall et al. reference specifically teaches the use of computer generated holograms for copying processes and Amako et al. '214 teaches means for their generation as

well as the advantage that a number of different holograms can be replayed without moving the master or the need to generate a optically produced master. These are clear advantages to the use of computer generated holograms in LC materials as the masters. The rejection stands

4. Claims 1,2,9-11,22-24,32-43 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sturdevant '946, in view of Redfield '861, Hall et al. '326, Amako et al. '214 and Sutherland et al. "Bragg Gratings in an acrylate ....", Chem. Mater. Vol. 5 pp. 1533-1538 (1993).

Sutherland et al. "Bragg Gratings in an acrylate ....", Chem. Mater. Vol. 5 pp. 1533-1538 (1993) teaches the pre-exposure to reduce the induction period (1534/right column) and the post exposure fixation/ postcuring (1537/left column). The LCs in the hologram allow it to be switched off and on in response to the potential applied across the electrodes.

It would have been obvious to one skilled in the art to modify the process of Sturdevant '946 by replacing the three exposure units with one exposure unit capable of performing both the interferometric exposure and the uniform exposures by replacing the holographic master used in the contact exposure with an LC device capable of recording computer generated holograms to save in equipment costs based upon the disclosure of equivalence for the use of lasers to provide the precure and fixation exposures by Redfield '861 for the same effect and the teachings of Hall et al. '326 that the use of optically produced or computer generated hologram in contact copying processes is equivalent and the teachings of Amako et al. '214 establish that in addition to the equivalence in functionality as a hologram the use of a computer to generate the holograms allows the holographic image of the master to be rapidly changed so that a plurality f different holographic images and copies thereof may be formed without the effort of creating an optical

master and further it would have been obvious to use the recording media of Sutherland et al. "Bragg Gratings in an acrylate ....", Chem. Mater. Vol. 5 pp. 1533-1538 (1993) to gain the benefits of being able to produce switchable holograms.

The examiner relied upon the basis provided above without further comment as no further arguments were directed at this rejection.

5. Claims 1-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sutherland et al. WO98/04650, in view of Margerum et al. '568 combined with either Eguchi et al. JP 03-188479, Wreede et al. '118 or Ikeda et al. EP 0087281 and further in view of Hall et al. '326 and Amako et al. '214.

Sutherland et al. WO98/04650 teaches PDLC holographic recording media which are used to record gratings. The use of two beam exposure processes with these materials is disclosed. (8/15-30 and 9/19-33) . The compositions are disclosed as using a photopolymerizable monomer, a second phase material, a photoinitiator, a co-initiator, a chain extender (or crosslinker) and optionally a surfactant. Useful photopolymerizable materials including mixtures of di, tri, tetra and penta acrylates, such as triethylethylene glycol diacrylate, trimetyhololpropane triacrylate, pentaerythritol triacrylate, pentaerythritol tetracrylate, pentaerythritol pentacrylate and the like. (10/14-27) The use of dipentaerythritol hydroxypentacrylate is disclosed. (11/12). Useful second phase materials are described as LC materials and include E7 and cyanobiphenyls (10/28-11/26 and 19/1-22/16) . Useful photoinitiators including rose Bengal esters, fluoresceins, cyanine dyes are disclosed. (11/36-12/16) Useful co-initiators including N-phenyl glycine are disclosed. (12/17-32) Useful crosslinker/chain extenders including vinyl monomers, such as N-vinyl pyrrolidone are

disclosed. (12/33-13/8) Surfactants lower the operating voltage and useful surfactants include octanoic acid. (13/9-14/13). The recording media are placed between ITO coated slides as discussed on pages 15 and 11 and through application of voltage through these ITO electrodes are electrically switchable to control the birefringence and transmittance of the LC material within the cured polymeric matrix. Useful amounts of the various components are disclosed on page 17. The stacking of these containing multiple gratings is disclosed on page 28 with respect to figure 17. The disclosure of these for application where holographic images are desired to be switchable is disclosed. (28/31-29/3).

Margerum et al. '568 teaches the use of a contact exposure through a grating mask to form diffraction gratings in PDLC recording materials. The use of a second exposure after the masked exposure is also disclosed with respect to figure 1. (5/5-57) The alternative use of a two beam holographic interference exposure is disclosed. (5/53-57, 2/27-31 and 2/54-59) The PDLC materials are coated between ITO coated glass films. (4/57-5/57). The recording of holographic patterns is emphasized. (11/33-41).

Eguchi et al. JP 03-188479 teaches the contact copying of the reflection hologram where the incident beam (4) passes through the recording medium (32) and is diffracted to form beam (41) by the underlying reflection hologram (22).

Wreede et al. '118 teaches the contact copying of the reflection holograms (225 and 229) where the incident beam (RB2) passes through the recording medium (235) and is diffracted to form beam (DB2) by the underlying reflection hologram.

Ikeda et al. EP 0087281 teaches with respect to figure 5 a master hologram, which is placed in close contact with a photosensitive layer and exposed to form a copy hologram. Figure

6 shows the formation of the diffracted beam and the passage of some of the transmitted beam, which acts as a reference beam.

It would have been obvious to replace the exposure process using two beam interferometric exposure processes of Sutherland et al. WO98/04650 with the contact exposure similar to the processes of either Eguchi et al. JP 03-188479, Wreede et al. '118 or Ikeda et al. EP 0087281 with a reasonable expectation of achieving comparable results based upon the disclosed equivalent functionality within the art and further in view of the disclosure of equivalence by Margerum et al. '568 with the advantage of simplifying the exposure set-up by eliminating the need for a beamsplitter, mirrors and other beam steering equiptment and further it would have been obvious to one skilled in the art to modify the invention of Sutherland et al. WO98/04650, in view of Margerum et al. '568 combined with either Eguchi et al. JP 03-188479, Wreede et al. '118 or Ikeda et al. EP 0087281 by replacing the optically produced holographic masters with computer generated masters such as those disclosed by Amako et al. '214 based upon the equivalence between the two as disclosed by Hall et al. '326 with the added benefit that the image within the master hologram can be easily changed without the effort of forming an optical master.

The examiner relied upon the basis provided above without further comment as no further arguments were directed at this rejection.

6. Claims 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gambogi et al. '011, in view of Hall et al. '326, Kato et al. '504, Sutherland et al. WO98/04650 and Ikeda et al. EP 0087281.

Gambogi et al. '011 teaches the serial interferometric exposure of red, green and blue gratings using a mask which is shifted with respect to figures 5a-c. The photosensitive medium shown in figure 10a shows the use of a holographic master in contact copying followed by the curing step in 10b. The different holographic recording layers in figures11, 12, 14, 22, 23 and 25 were differently sensitized to record only a single wavelength range.

Kato et al. '504 teaches the stepping of the LCD between successive exposures to record objects at different distances.

It would have been obvious to one skilled in the art to substitute the contact exposure process of Ikeda et al. EP 0087281 for that of Gambogi et al. '011 where three differently sensitized layers are present with a reasonable expectation of forming a useful transmission holographic filter and further to use a multilayered PDLC holographic master such as that taught by Sutherland et al. WO98/04650 based upon the disclosure that optically or computer generated holographic masters are equally useful in contact copying processes and to use the different holographic layers to record depth/stereoscopic information as well based upon the disclosure of Kato et al. '504 that it is useful to do so.

The applicant argues that the limitation added to claims 1,12,22,32 and 46 is already present in claim 48 as the master is disclosed as variable. The examiner agrees, but note that the combination of the references includes a basis for the obviousness of the use of the PDLC holograms of Sutherland et al. WO98/04650 as the master. The rejection stands.

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J Angebranndt whose telephone number is 703-308-4397. The examiner can normally be reached on Mondays-Thursday and alternative Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Martin J Angebranndt
Primary Examiner
Art Unit 1756

December 28, 2001